

Study Guide

Direct and Inverse Variation

If two variables x and y are related by the equation $y = kx$, where k is a nonzero constant, then the equation is called a **direct variation**, and k is called the **constant of variation**.

If two variables x and y are related by the equation $xy = k$, where $k \neq 0$, then the equation is called an **inverse variation**.

Example 1: If y varies directly as x , and $y = 12$ when $x = 4$, find y when $x = 7$.

$$\begin{array}{l|l} y = kx & y = kx \\ 12 = 4k & y = 3(7) \\ \frac{12}{4} = \frac{4k}{4} & y = 21 \\ 3 = k & \end{array}$$

Example 2: If y varies inversely as x , and $y = 3$ when $x = 12$, find x when $y = 4$.

$$\begin{array}{l|l} xy = k & xy = k \\ 12(3) = k & 4x = 36 \\ 36 = k & \frac{4x}{4} = \frac{36}{4} \\ & x = 9 \end{array}$$

Solve. Assume that y varies directly as x .

1. If $y = 4$ when $x = 2$, find y when $x = 16$.

2. If $y = 9$ when $x = -3$, find x when $y = 6$.

3. If $y = \frac{2}{5}$ when $x = \frac{1}{3}$, find y when $x = \frac{1}{4}$.

4. If $y = \frac{1}{4}$ when $x = \frac{1}{8}$, find x when $y = \frac{3}{16}$.

Solve. Assume that y varies inversely as x .

5. If $y = 9$ when $x = 7$, find y when $x = 2$.

6. If $y = 4.3$ when $x = 12.9$, find y when $x = 15.8$.

7. If $x = \frac{1}{2}$ when $y = \frac{1}{3}$, find y when $x = \frac{1}{4}$.

8. If $y = -6$ when $x = \frac{1}{4}$, find y when $x = \frac{3}{16}$.